December 18, 2015

Mr. Ron Carrington
Director of Central Engineering
Hydrite Chemical Co.
114 N. Main St,
Cottage Grove, WI 53527

RE: Terre Haute Facility Air Monitoring Draft System Overview
FILE: 20006\62499

Dear Ron:

The following overview and discussion provides our initial recommendations for a proposed air monitoring system at Hydrite's Terre Haute facility. The monitoring system proposed below is based on our initial discussions with Greg Kreitzer and you, and OBG's site visit and meeting with Ian Hartsook last week. During the visit, OBG reviewed process-related sulfur dioxide (SO_2) and ammonia (NH_3) sources, the surrounding community (off-site receptors), and the existing perimeter air monitoring station. We also reviewed potential air monitoring and meteorological station siting, and discussed alarming and communication needs. Discussion of the resulting system overviewed below is organized into the following sections:

- Air Monitoring Objectives and Station Locations
- Instrumentation and System Configuration
- Alarm System – Levels and Communication
- Budgetary Equipment Costs

AIR MONITORING OBJECTIVES AND STATION LOCATIONS

As we understand it, the objective of the air monitoring system is to monitor site-related SO_2 and NH_3 levels from process fugitive and stack emissions to help on control of on-site levels within acceptable worker exposure limits and off-site levels within Federal and/or Hydrite emergency response/contingency plan guidelines for acute exposure.

PROCESS AREA MONITORING

During our site visit, the following five areas were identified as having high potential fugitive SO_2 and NH_3 emissions (primary fugitive source areas):

- Building TH100 (P01) (Primary Source: NBS Tank R1) – SO_2 and NH_3
- Building TH200 (P02) (Primary Source: SO_2 Burners) – SO_2 and NH_3
- Building TF200 (TO2) (Primary Source: scrubber fan venting during storage tank transfer) – SO_2 only
- Building TH300 (P03) (Primary Source: Reactor R4) – SO_2 and NH_3
- Outdoor NH_3 Bullet area (during Bullet filling from tanker) – NH_3 only

Four air monitoring stations are proposed to monitor these five source areas. As indicated in Figure No. 1, three of the stations will be located in Buildings P01, P02, and P03 and will monitor SO_2 and NH_3 in each area. A fourth station will be located in Building TO2 and will monitor SO_2 from the indoor storage tank area, and also NH_3 near the outdoor NH_3 Bullet via an extended sample line and inlet.

PROPERTY LINE AND RACETRACK MONITORING

The nearest community receptor routinely visited by the public is the Hulman Mini-Speedway quarter-midget racetrack adjacent to and north of the facility. The racetrack property runs the length of the facility's north property line, and consists of the racetrack, pit area, stands, playground and open area, and parking area (sometimes used for event camping). In addition to the racetrack, the nearest private residences are located approximately 700 feet to the west, 1,200 feet to the south, 1,000 feet to the east, and 2,700 feet to the north.

Currently the facility operates one outdoor perimeter air monitoring station for SO_2 (0 to 25 ppm), NH_3 (0 to 250 ppm) and hydrogen sulfide (0 to 100 ppm) located about 10 feet onto the racetrack property, north of P01. Sensors are positioned approximately 5 feet above grade, and are wired to digital panel meters located in a control room area in PO1. The proposed new air monitoring system would replace the existing station sensors with SO_2 and NH_3 sensors only, though if needed, the new system can be re-configured to include measurement of hydrogen sulfide at one or more locations.

For the new system, we propose six property line or off-site monitoring stations for SO_2 and NH_3 – one off-site at the racetrack and five along or within the site property line as follows:

- Racetrack – One station near the south end of the west stands
- North property line – three stations along the property line fence, one each in the direction of the following off-site receptors to the north and east:
  - Racetrack, pit area and stands north of P02
  - Playground/gathering area north of P01, and nearest residences to the north
  - Parking/camping area north of the facility main office, and in the direction of the nearest residences to the east
- West property line – one station in the direction of the nearest residences to the west
- South property line – one station in the direction of the nearest residences to the south

The proposed station locations were selected so the each station is between the group of primary fugitive process and stack emission sources and the nearest off-site receptors in that direction so as to optimize, to the extent feasible, protection to the nearby downwind community. The effectiveness of downwind stations at measuring maximum concentrations crossing at the property line toward off-site receptors at any given time will depend on the location and height of the event's actual emission source and winds. The proposed monitoring inlet heights of stations near the south and west property lines will be 5 feet to represent normal breathing height. However, monitoring inlet heights of stations located along the north property line will be 5 feet or possibly higher depending on the air dispersion results of a downwind building cavity assessment, which will conduct during the air monitoring plan development.

METEOROLOGICAL MONITORING

A meteorological station is proposed for installation on the north side of the B1 rooftop to monitor wind speed and direction and identify areas downwind of primary fugitive process and stack emission sources. The B1 rooftop has been proposed since it is between the racetrack and exhaust stacks from both SO_2 burner buildings, and also visible from both the racetrack and facility's main office. The meteorological station will also measure temperature and relative humidity since fluctuations in those parameters can affect instrument performance.

INSTRUMENTATION AND SYSTEM CONFIGURATION

PROCESS AREA MONITORS

SO_2 and NH_3 measurements at each process area monitoring station will be accomplished using real-time Rae Systems MultiRAEs (specifications sheet attached). The MultiRAE uses electrochemical sensors to continuously measure SO_2 from 0.1 to 20 parts per million (ppm) and NH_3 from 1 to 100 ppm. The MultiRAEs will be housed in water-tight NEMA enclosures with bulkhead ports for sample inlets and wiring.`

PROPERTY LINE AND RACETRACK MONITORS

Property line and off-site air monitoring stations will consist of a MultiRAE for NH_3 and an Interscan LD24 for SO_2 (specifications sheet attached). The LD24 is a continuous gas monitor that uses an electrochemical sensor to measure SO_2 from 0.01 ppm to 5.00 ppm. Please note, though the MultiRAE which will be used to measure NH_3 at each station will also measure SO_2. However, its SO_2 detection limit of 0.1 ppm may be too high to evaluate levels near the proposed SO_2 control level (0.2 ppm, as discussed in the alarms section below) due to normal instrument zero drift. However, during development of the draft air monitoring plan in January, OBG will test the operation of the MultiRAE's SO_2 sensor, and advise Hydrite if we believe it can reliably be used instead of the Interscan LD24 at some or all property line and off-site stations.

MONITOR DATA LOGGING

Data from real-time monitors will be automatically collected, time-averaged and stored on a Campbell Scientific CR800 digital data logger located at each monitoring station. A central data logger (Campbell Scientific CR6) will then automatically retrieve data from each station data logger via either fiber optic or Ethernet cable for process and property line stations, and wirelessly via cellular modem for the off-site racetrack station. The central data logger will be connected directly to a central PC with internet access which will provide final data storage.

CENTRAL DATA COLLECTION SYSTEM

It is anticipated the central data logger and PC will be located near the Facility's Delta V process monitoring servers, adjacent to the control room. The central PC will operate Campbell Scientific's LoggerNet data logger software and Real-Time Monitor and Control (RTMC) software. RTMC can be configured to display instantaneous real-time data, time-averaged data, historic trends, as well instrument status. Limited control of monitoring station instruments can also be configured through LoggerNet and RTMC such as pausing instrument operation or invalidating measurements instrument calibrations. RTMC also includes software to develop a network website which can provide secure remote data access to Hydrite staff via the internet.

ALARM SYSTEM - LEVELS AND COMMUNICATION

All monitoring stations will provide automated alarm notifications based on real-time and time-averaged data when measured concentrations reach preset alarm levels. Preset levels will consist of, at a minimum, an action level and a lower cautionary control level for both SO_2 and NH_3. Two pairs of action and control of levels will be established for each parameter, one for process area stations, and another for property line and off-site stations.

Each action/control level alarm will notify Hydrite via wireless message to central PC, email or smartphone when alarm levels are reached. The system will also provide visible and/or audible local alarm notifications (at both action and control levels) at each station. Action level alarms will indicate an immediate air quality concern and need to restrict access and implement immediate corrective action. The lower cautionary control level alarms will indicate a potential for air quality significant concern if levels increase further and need for controls.

PROCESS AREA ALARM LEVELS

Proposed process area station alarm levels are based on OSHA 8-hour PEL and TLV, and NIOSH TWA levels, but will be triggered based on shorter 1-hour time-averaged data to enable quicker response to releases of fugitive emissions. Proposed limits are as follows:

- SO_2
  - Action Level: 5 ppm
  - Control Level: 2 ppm
- NH_3
  - Action Level: 50 ppm
  - Control Level: 25 ppm

For process area action level alarms, staff should not remain in the affected area without proper breathing apparatus, and corrective measures should be immediately implemented. For control levels alarms, implementation of corrective measures to reduce levels is recommended to prevent continued elevated levels.

PROPERTY LINE AND OFF-SITE AREA ALARM LEVELS

Proposed alarm level alarms for property line and off-site areas are based on current guidance from the USEPA Acute Exposure Guideline Levels (AEGL) and OSHA odor thresholds levels, and will be triggered based on 15-minute time-averaged data to enable quick response to correct process fugitive or stack emissions. Proposed limits are as follows:

- SO_2
  - Action Level: 0.75 ppm
  - Control Level: 0.2 ppm
- NH_3
  - Action Level: 30 ppm
  - Control Level: 5 ppm

For property line and off-site alarms when winds blow toward the racetrack, based on USEPA AEGLs we suggest evacuation of the racetrack area at the action level to avoid "serious effects" from SO_2 and "irritation or non-sensory effects" from NH_3. For control level alarms, we suggest process curtailment and corrective measures based on USEPA AEGLs to avoid "irritation or non-sensory effects" from SO_2 and from OSHA guidance to avoid potentially objectionable odors from NH_3.

ALARM COMMUNICATION

SO_2 and NH_3 data measured at each indoor and outdoor monitoring station will be automatically and continuously transmitted in real-time to the facility's air monitoring central data logger and PC. When triggered by station exceedance of an action or control level, local visual and audible alarms will be automatically activated at the station. In addition, alarms describing the alarm type and concentration will be wirelessly sent by the central PC to designated Hydrite staff via email, and/or text message. In addition, for alarms on the north property line and racetrack station, a separate visible alarm (such as stoplight) can be located at the racetrack. The racetrack alarm light can be set to change status from acceptable levels to control or action levels either automatically or manually by Hydrite using secured PC or smartphone wireless connection.

BUDGETARY EQUIPMENT COSTS

The following table provides budgetary costs estimate for the monitoring system instrumentation components (hardware and software). Note that procurement, configuration, programming and installation are not included, and will be estimated along with equipment quotes as part of our proposal for Phase 2 and 3 of this program.

Monitoring System Components	Quantity	Estimated Cost
MultiRAE (SO_2 and NH_3)	**10** (all monitoring stations)	**$60,000**
LD24 (Low-level SO_2)	**6** (property boundary/off-site stations)	**$40,000**
Enclosures, Data loggers, Communication, and Alarm Components	**11** (each monitoring station plus central location)	**$50,000**
Weather Station	**1**	**$10,000**
	Total Budgetary Cost:	**$160,000**

Please contact me with any questions or comments at 93150 956-6410, or at scott.manchester@obg.com.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Scott C. Manchester
Project Manager

Attachments: Figure No.1 – Proposed Air Quality Monitoring Station Locations
Specification Sheets: MultiRAE; InterScan L24; Campbell CR 850; Campbell CR6

